WHAT IS CLAIMED IS:

1. A method of fabricating compact cells containing alkali atom vapor which comprises the following steps:

a) forming an cell having a volume of 1 cm^3 or less and an opening therein;

b) filling the cell with alkali atoms; and

c) sealing the opening of the cell,

wherein the completed cell has at least one window thorough which irradiation can pass in order to react with the alkali atoms within the cell.

2. The method of fabricating compact cells containing alkali atom vapor according to claim 1, wherein the filling of the cell in step b) and the sealing of the cell in step c) are conducted in a chamber having a controlled environment that contains alkali atoms.

3. The method of fabricating compact cells containing alkali atom vapor according to claim 1, wherein the filling of the cell in step b) comprises filling the cell with alkali atoms and a buffer gas.

4. The method of fabricating compact cells containing alkali atom vapor according to claim 2, wherein the controlled environment contains alkali atoms and a buffer gas so that the cell is filled with alkali atoms and the buffer gas.

5. The method of fabricating compact cells containing alkali atom vapor according to claim 1, wherein the filling of the cell in step b) and the sealing of the cell in step c) are conducted by placing an alkali metal in the cell, placing the cell in a chamber containing a buffer gas and sealing the cell in the chamber.

6. The method of fabricating compact cells containing alkali atom vapor according to claim 1, wherein the filling of the cell in step b) comprises placing reactants in the cell which are capable of reacting to produce alkali atoms and reacting the reactants to form alkali atoms in the cell.

7. The method of fabricating compact cells containing alkali atom vapor according to claim 6, wherein the reactants also form a buffering gas.

8. The method of fabricating compact cells containing alkali atom vapor according to claim 1, wherein the filling of the cell in step b) comprises using an atomic beam to fill the cell with alkali atoms.

9. The method of fabricating compact cells containing alkali atom vapor according to claim 1, wherein the cell is formed in step a) and sealed in step c) using anodic bonding.

10. The method of fabricating compact cells containing alkali atom vapor according to claim 9, wherein the cell is formed in step a) by providing a silicon wafer with a hole there through and bonding a glass plate to one side of the silicon wafer to close one end of the hole.

11. The method of fabricating compact cells containing alkali atom vapor according to claim 10, wherein the cell is sealed in step c) by bonding another glass plate to another side of the silicon wafer to seal the hole.

12. The method of fabricating compact cells containing alkali atom vapor according to claim 9, wherein the cell is formed by providing a silicon wafer with a formed recess that does not extend through the wafer and bonding a transparent or semitransparent window on the silicone wafer to seal the recess.

13. The method of fabricating compact cells containing alkali atom vapor according to claim 1, wherein the cell comprises a hollow tube that is sealed by irradiation.

14. The method of fabricating compact cells containing alkali atom vapor according to claim 13, wherein the sealed portion of the hollow tube comprises a lens through which irradiation can enter the hollow tube.

15. The method of fabricating compact cells containing alkali atom vapor according to claim 13, wherein the filling of the cell in step b) comprises connecting a filling tube to the cell.

16. A physics package for an atomic frequency reference, that comprises an alkali vapor filled cell having a volume of 1 cm^3 or less, which alkali vapor filled cell is produced by the steps of:

a) forming an cell having a volume of 1 cm^3 or less and an opening therein;

b) filling the cell with alkali atoms; and

c) sealing the opening of the cell.

17. A physics package for an atomic frequency reference according to claim 16 which further comprises:

a laser;

a photodiode; and

a microoptics arrangement for trapping a coherent population and exciting atomic microwave resonance.

18. A physics package for an atomic frequency reference according to claim 17, wherein the alkali vapor filled cell is optically positioned between the laser and the photodiode so that a light beam from the laser is perpendicular to the sealed opening of the cell.

19. A physics package for an atomic frequency reference according to claim 16, wherein the entire physics package is formed of a common wafer substrate.

20. A physics package for an atomic frequency reference according to claim 16, wherein the entire physics package is assembled in a semi-monolithic assembly.

21. A physics package for an atomic frequency reference according to claim 19, further comprising:

a light source;

at least one of a diffraction lens and a refractive lens to collimate a light beam produced by the light source; and

a photodetector.

22. A physics package for an atomic frequency reference according to claim 21, further comprising:

means selected from a deposition of carbon or an optically dense glass for attenuating light that is directed on the alkali vapor filled cell from the light source.

23. A physics package for an atomic frequency reference according to claim 21, further comprising:

at least one of a heating element to heat the alkali vapor filled cell and a electromagnet to create a magnetic field.